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Tactical Control System
Preliminary Design Review

Part 2 - Day 1

Outrider Data Control Module (ODCM) Hardware Configuration Item (HWCI)

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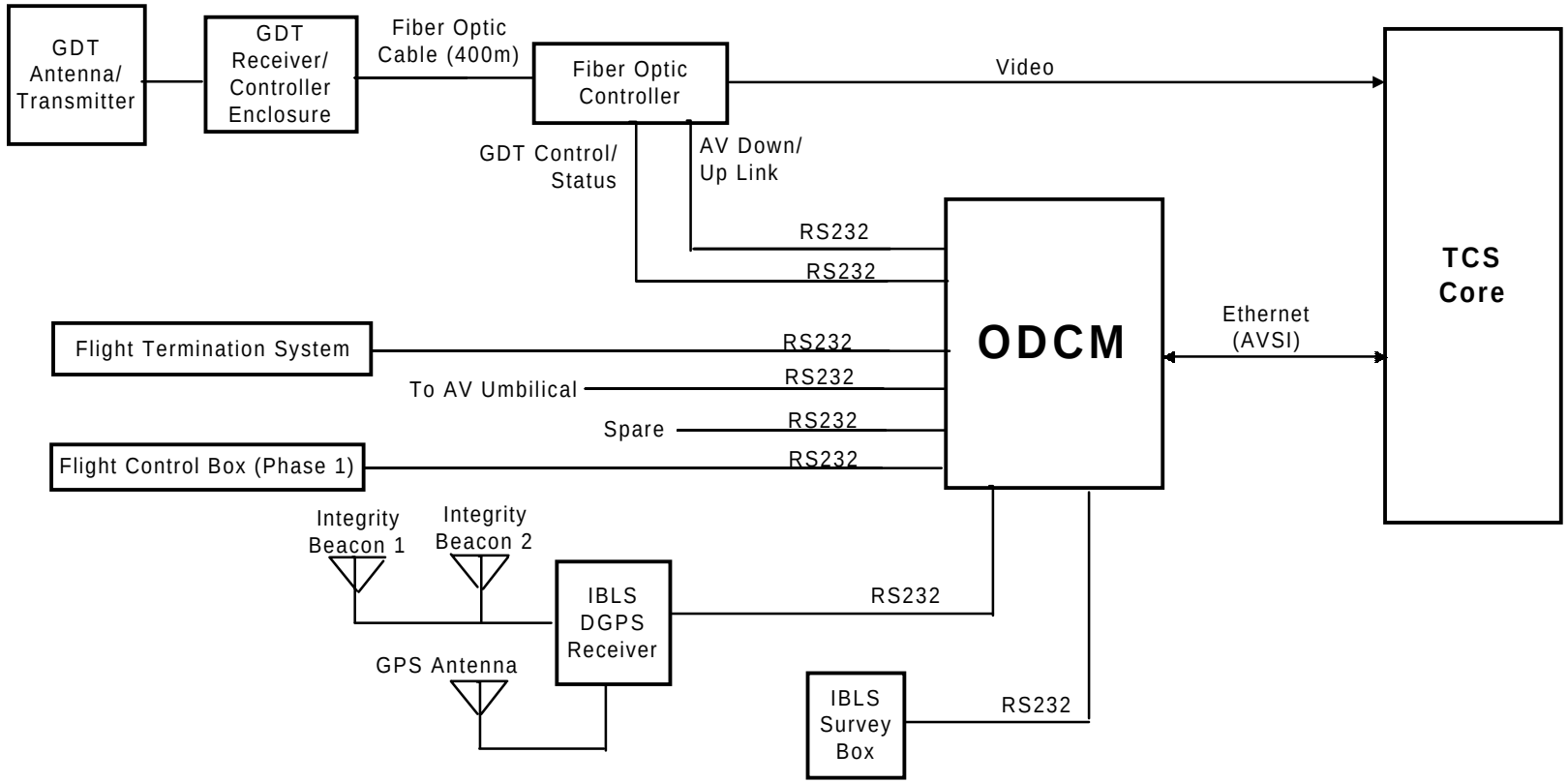
ODCM HWCI AGENDA

- Function
- Design Description
- Requirements Compliance

ODCM Function

- The ODCM translates AV commands, control, and telemetry between TCS Core and Outrider-specific formats
- The AVSI specifies requirements for TCS Core - ODCM interface
- ODCM tactical hardware must meet requirements per HWPS (in process - NSWCDD):
  - performance
  - environmental
  - EMC
  - “ilities”
- Draft DCM Hardware Development Specification (7-7-97) is latest published guidance on tactical DCM hardware requirements
- Compared Phase 1 DCM selection to 7-7-97 spec to identify needed growth areas

System Diagram



ODCM Hardware Selection Status

- Current ODCM software hosted on TAC3 UNIX workstation for initial development
- Software to be re-hosted on tactical form factor hardware by June 98 (Demo 2A/B)

Considerations

- Low schedule and technical risk
- DCM hardware development specification (7 July 97 - draft)
- DCM hardware implementation left to contractor
- Evaluate both UNIX and RT O/S VME approaches
- TCS RTP to be VME

Selection

- Selected HP Model 748/132L VME Industrial Workstation for Phase 1
  - uses HP 744 Single Board Computer and HP-UX 10.20
  - meets DCM tactical form factor requirements
  - ruggedized
  - COTS

- growth path to meet evolving Phase 2 tactical environmental requirements

Phase 1 VME ODCM

HP Model 748
Industrial System

ODCM Hardware Configuration

Item	COTS Vendor	Description	Quantity per System
VME Chassis/ Power Supply	HP	Model 748/132L, industrial grade, 8 VME slots, 19” rack mountable	1
Processor Card	HP	744/132L SBC, 132 MHz, 32 MB DRAM	1
Memory Card	HP	64 MB DRAM	1
Hard Drive	HP	4 GB, SCSI-2	1
CD ROM Drive	HP	CD-ROM drive, 12X, SCSI-2	1
I/O Card	RTP	Serial, RS-232, 4-channel	2
Operating System	HP	HP-UX 10.20	1
Floppy Disk Drive	HP	1.44 inch, SCSI-2	1
Monitor	HP	17”, color	1
Keyboard/Mouse	HP	Standard keyboard and mouse	1

Physical/Power Performance

Parameter	748 Characteristic	7-7-97 DCM H/W DS Rqmt	Complies
Dimensions Rack Mountable	in standard 19” rack	in standard 19” rack	Yes
Height	12.22”	10.47” minimum	Yes
Width	16.75”	15.72” maximum	Discuss rqmt
Depth	16.24” plus Standard Connector Area	18”/22” min/max (includes Standard Connector Area)	Yes
Weight	est. 65 lbs	not specified	--
Power Input Power	Auto-ranging, 90-132V, 180-250V, 50-60 Hz	120 V, 50-60 Hz	Yes
Power Consumption	1080 Watts max	1200 Watts max	Yes
Power Control	Protected ON/OFF switch	Protected ON/OFF switch	Yes
Power Indicator	Power ON indicator	Power ON indicator	Yes
Power Protection	Circuit breaker - front panel	Circuit breaker - front panel	Yes
Grounding	Ground lug on rear panel	Ground lug on rear panel	Yes

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ODCM Processing Performance

Parameter	Derived Requirement (based on Outrider GCS Talon)	Capability	Complies
Throughput	60 MHz PA-7100LC 1.62 SPEC_int95 benchmark 2.39 SPEC_fp95 benchmark	132 MHz PA-7300LC 5.90 SPEC_int95 benchmark 6.22 SPEC_fp95 benchmark	Yes
Main Memory Size	32 Mbytes	96 Mbytes	Yes
Spare Slots	0	3	Yes
I/O Channels - Number	8	10	Yes
Network Capacity	<1 Mbits/sec Ethernet	10 Mbits/sec Ethernet	Yes
Mass Storage Capacity	0.5 - 2 Gbytes	4 Gbytes	Yes
Expansion - Throughput	--	can upgrade to 165Hz processor 7.90 SPEC_int95 benchmark 7.64 SPEC_fp95 benchmark	Yes
Expansion - Memory	--	Can add memory card	Yes
Expansion - Mass Storage	--	Can add/upgrade hard drive	Yes

Environmental Performance

Parameter	748 Characteristic	7 July 97 DCM DS Requirement	Complies
Temperature, Operating	0 to 55 deg C	10 to 35 deg C	Yes
Temperature, Non-Op	-40 to 70 deg C	-20 to 50 deg C	Yes
Humidity (relative)	95%	95%	Yes
Altitude, Operating	15,000 feet	10,000 feet	Yes
Altitude, Non-Op	15,000 feet	40,000 feet	Discuss rqmt

Environmental Performance

Parameter	748 Characteristic	7-7-97 DCM H/W DS RQMT	Complies
Operating - Random Vibration	0.2 g2/Hz; 5-350Hz, 0.3 rolloff @ 6dB/Octave to 500Hz	Operating: No degradation while operating in TBD mechanical environments	TBD
Mechanical Shock	Operating, end-use handling shock 150 cm/s (60in/sw) using <3 ms ½ sine wave (1230 ms/2 faired acceleration)		
Survival - Random Vibration	0.2 g2/Hz from 5-100Hz, 0.2 rolloff @ 6dB/Octave to 137Hz; 0.0107 g2/Hz from 137-350Hz, rolloff @ 6dB/Octave to 500 Hz	Non-operating: No degradation during TBD Ground and Transport mode environments	TBD
Survival - Swept Sine Vibration	10m/s2 (1G0-pk) from 5-500Hz, sweeping at 1 Octave/min, dwell 10 min. at 4 lowest freq's; 20m/sw (2G0-pk) from 10-150Hz, 10 sweeps at 1 Octave/min		
Survival - Trans-portation Shock	(unpacked) 295 m/s2 minimum (>30G) using 605cm/s (238in/sec) trapezoidal wave		
Survival - Packaged	Drop height = 24 inches (61 cm)	No degradation after 48" drop in	TBD

Shock		shipping/storage container	

Electromagnetic Compatibility

Parameter	748 Characteristic	7-7-97 DCM H/W DS Rqmt	Complies
Radiated and conducted emissions	FCC Class A, 47 CFR Parts 2 & 15; VCCI Class A; ITE-EN55022/CISPR22 Class A; ISM-EN55011/ CISPR11 Class A	Enclosure shielding iaw FCC Part 15	Yes
Magnetic emissions	49 CFR, IATA Dangerous Goods Regulations, 30 ed – < 2 milligauss at 2.1 m		
Radiated immunity (IEC 801-3 level 2)	ITE/ISM-EN55024-3 – 3V/m	EMI: No degradation after exposure to 200 V/m at frequencies to 18 GHz	TBD
ESD immunity	ITE-prEN55024-2 – 3/8KV CD/AD; ISM-prEN50082-2 – 4/8KV CD/AD; 15KV AD (op.), 25KV AD (survival)		
Magnetic immunity	317 A/m (4 Gauss), exceeds IEC 801-8 level 5 – 100 A/m		
Line transient immunity	Conducted fields IEC 801-6 level 2 – 3V rms		
Fast transients	ITE/ISM-prEN55024-4, IEC 801-4 levels 3 – 2KV mains, 1KV ports		
Surge transients	IEC 801-5 level 3 – 1KV DM, 2KV CM; 3KV pk. Ring wave DM/CM		

Environmental Performance

- The remaining environments specified in the DCM Hardware DS draft (7-7-97) are
  - Rain
  - Snow
  - Icing
  - Fungus
  - Salt Fog
  - Wind
  - Blowing Sand and Dust
  - Lightning
  - Applications prohibiting air cooling/requiring conduction cooling

- The ODCM tactical hardware will be specified as appropriate to meet the above environments once the DCM Hardware Performance Specification is released.

Reliability/Maintainability/Availability

Parameter	748 Characteristic	7 July 97 DCM DS Requirement	Complies
Maintainability MTBOMF	Not Available	> 25 hours	TBD
MTTR	est. ≤ 0.5 hour (operator/org. maint.) est. ≤ 2.0 hours (intermed. Maint.)	≤ 0.5 hour (operator/org. maint.) ≤ 2.0 hours (intermed. Maint.)	Yes
Field replaceable internal components	Circuit cards, internal power supplies, fuses, fans and fan filters, and external viewable lamps/ indicator lights	Circuit cards, internal power supplies, fuses, fans and fan filters, and external viewable lamps/ indicator lights	Yes
DCM Reliability MTBF	Not Available	≥ 215 hours	TBD
Transportability	- Transportable by ground/sea/air - Configurable for transport in ≤ 0.5 hr - Transportable by single person	- Transportable by ground/sea/air - Configurable for transport in ≤ 0.5 hr - Transportable by single person	Yes
Logistics - maintenance	Operational for 72 hours w/o any external support, augmented by a MMF for 15 days beyond initial 72 hrs	Operational for 72 hours w/o any external support, augmented by a MMF for 15 days beyond initial 72 hrs	Yes
Logistics - human factors	- Single person operation - Transportable by single person	- Single person operation - Transportable by single person	Yes

	- Use while wearing MOPP gear	- Use while wearing MOPP gear	

Documentation

- ODCM users manual containing:

- operational description
- interconnect diagram
- connectorization definition
- physical/mechanical/electrical ICD
- maintenance information

- COTS vendor manuals